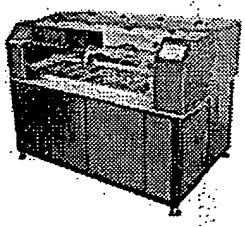
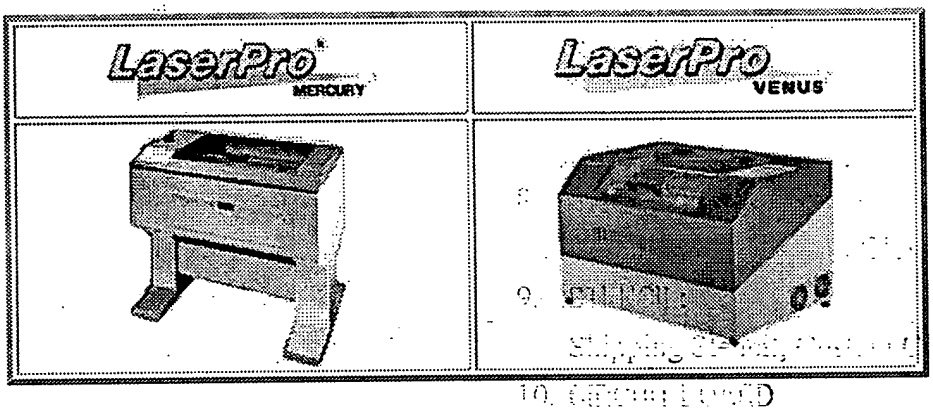
Product



LaserPro NEPTUNE
with the super power & super large work area, NEPTUNE would be your best business partner. No matter cutting or engraving. NEPTUNE can satisfy all your needs.

Other Models



Materials:

Plastic, Acrylic, Polyester Films, Rubber, Bamboo, Leather, Fabrics, Glass, Crystal, Coated Metal, Vinyl, Stone, Wood, Stone, Ceramics.

Application:

1. **SIGNAGE**
2. **DESK ACCESSORIES:**

   Nameplates, Business Card Holders, Stick Note Holder.
3. **RUBBER STAMPS**
4. **AWARDS & PLAQUES**
5. **MINIATURES:**

   Doll House, Doll Furniture, Architectural Model.
6. **GIFT & TROPHY:**

   Pen Sets, Clock, Glassware, Mugs, People & Pet Portraits, Picture Frame.
7. **PROMOTION:**

   Exhibition, Give Away Items, Trade Mark..
8. **SPORTING GOODS:**

   Baseball Bat, Baseball Gloves, Head of Golf Club.
9. **STENCIL:**

   Shipping Stencil, Custom Cut Stencil
10. **CIRCUIT BOARD**
11. **DIPLOMAS & CERTIFICATES**
12. **OTHER STUFF:**

    Buttons, Textile Appliqu?, Crystal, Jewel Accessories.

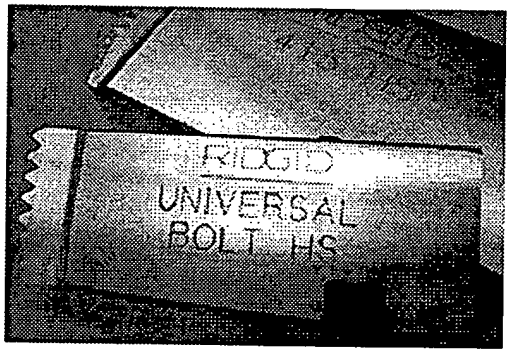
billing.

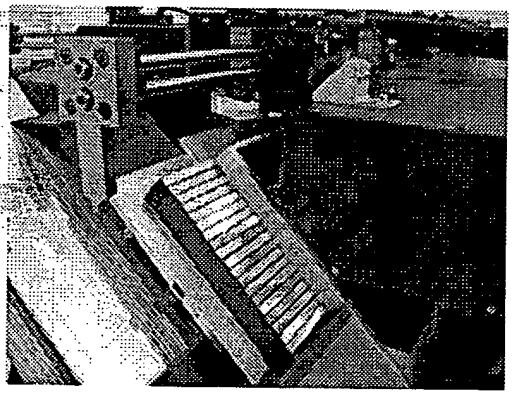
If your business gives away logo'd golf balls, imagine the impact and long-lasting impression of a Reid Lockhart wedge with your logo laser-engraved. While golf balls will be lost [illegible], your

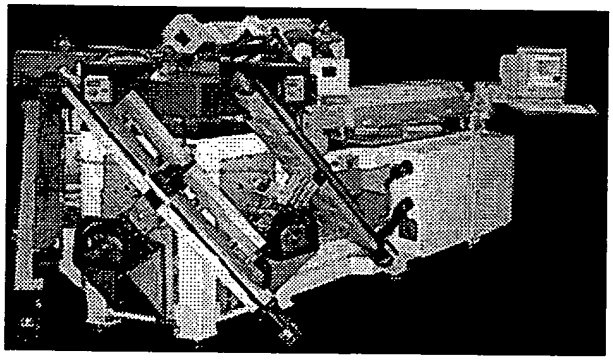
TOP OF PAGE

Control Micro Systems

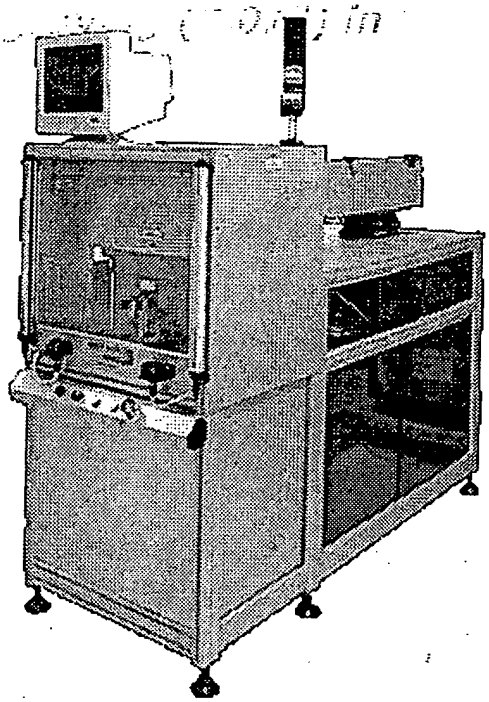
Steel Tool Dies

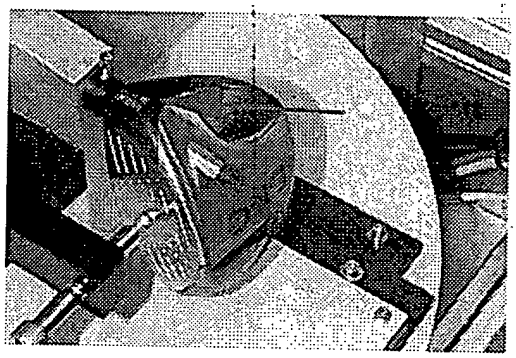


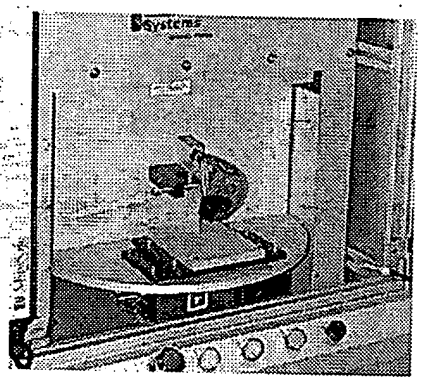




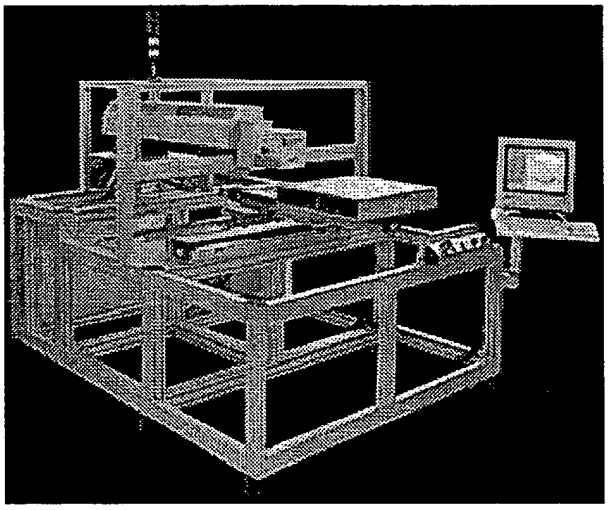
Golf club heads

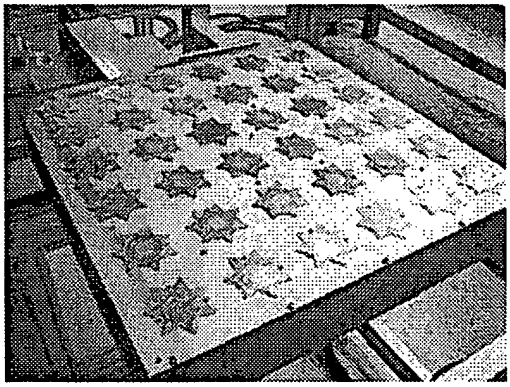






Deep engraving (0.01") in metal





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United States Patent [19]

Macken et al.

[11] **4,156,124**

[45] **May 22, 1979**

[54] **IMAGE TRANSFER LASER ENGRAVING**

[75] Inventors: **John A. Macken; Paul N. Palanos,** both of Santa Rosa, Calif.

[73] Assignee: **Optical Engineering, Inc.,** Santa Rosa, Calif.

[21] Appl. No.: **787,471**

[22] Filed: **Apr. 14, 1977**

[51] Int. Cl.[2] **B23K 9/00**

[52] U.S. Cl. ..... **219/121 L; 219/121 LM**

[58] Field of Search ..... 219/121 L, 121 LM, 158, 219/159, 121 EB, 121 EM

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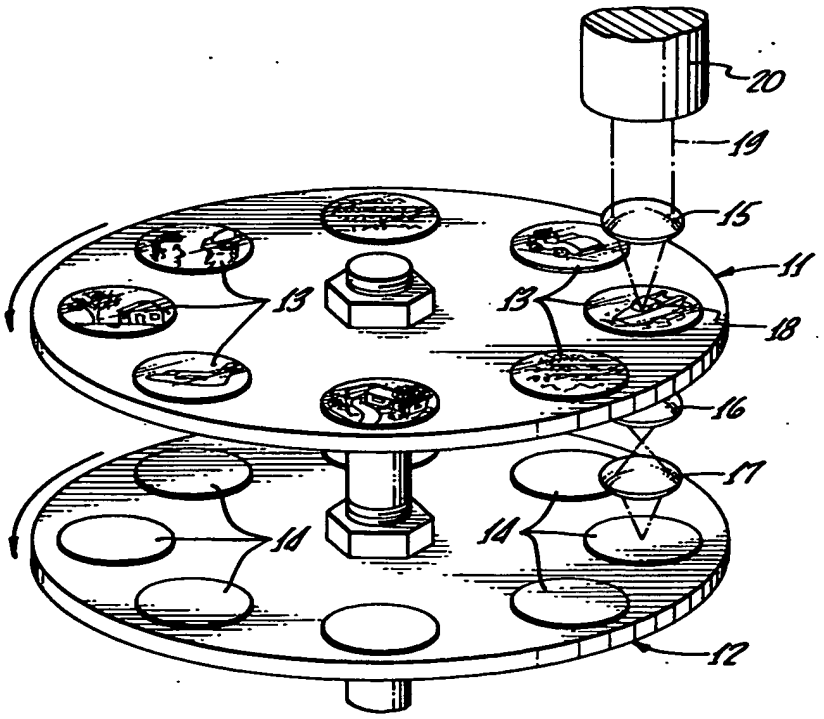
3,965,327	6/1976	Ehlscheid et al.	219/121 LM

Primary Examiner—J. V. Truhe
Assistant Examiner—Fred E. Bell
Attorney, Agent, or Firm—Edward E. Roberts

[57] **ABSTRACT**

The invention relates to a non-contact laser engraving apparatus and process. A laser beam is directed onto a work piece by a mask arrangement. The mask can be transparent or reflective. Optical means are used to transfer the laser beam and thus the image produced by the mask onto the work piece. In one embodiment parallel support tables hold the mask and the work piece in fixed, spaced apart, parallel arrangement. The support tables and/or the laser beam source are moved relative to each other such that the beam scans the mask and thus the work piece.

11 Claims, 6 Drawing Figures



United States Patent [19]

Herren et al.

[11] **Patent Number: 5,030,551**

[45] **Date of Patent: Jul. 9, 1991**

[54] **LASER MARKING OF CERAMIC MATERIALS, GLAZES, GLASS CERAMICS AND GLASSES**

[75] Inventors: **Fritz Herren, Düdingen; Manfred Hofmann, Marly, both of Switzerland**

[73] Assignee: **Ciba-Geigy Corporation, Ardsley, N.Y.**

[21] Appl. No.: **503,332**

[22] Filed: **Apr. 2, 1990**

[30] **Foreign Application Priority Data**

Apr. 6, 1989 [CH] Switzerland 1276/89

[51] **Int. Cl.**[5] **G03C 5/16; G03C 5/00**

[52] **U.S. Cl.** ..... **430/495; 430/947; 430/945; 430/346; 430/270; 346/76 L**

[58] **Field of Search** ..... 430/270, 346, 495, 945, 430/947, 286; 346/76 L, 135.1

[56] **References Cited**

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Ullmann's Enzyk. Chem. 4th Ed., vol. 14, p. 11.
Organic Titanium Compounds Brochure p. 13.
Gretag Laser Systems Brochure.

Primary Examiner—Hoa Van Le
Assistant Examiner—Ashley I. Pezzner
Attorney, Agent, or Firm—Luther A. R. Hall

[57] **ABSTRACT**

A method of laser marking ceramic materials, glazes, glass ceramics and glasses of any desired form, which comprises applying to the material to be marked a 100 to 10,000 Å thick transparent layer of titanium dioxide, then irradiating said oxide layer with a pulsed laser such that the radiation is directed onto said layer in accordance with the form of the marking to be applied, and using laser light of a wavelength which is sufficiently absorbed by the oxide layer, so that a discolouration of said oxide layer is produced at the irradiated areas.

13 Claims, No Drawings

US005322436A

United States Patent [19]

Horng et al.

[11] Patent Number: 5,322,436

[45] Date of Patent: Jun. 21, 1994

[54] **ENGRAVED ORTHODONTIC BAND**

[75] Inventors: Bryan L. Horng, Rowland Heights; Steven A. Martin, Lafayette, both of Calif.

[73] Assignee: Minnesota Mining and Manufacturing Company, St. Paul, Minn.

[21] Appl. No.: 968,008

[22] Filed: Oct. 26, 1992

[51] Int. Cl.[5] A61C 3/00

[52] U.S. Cl. 433/23

[58] Field of Search 433/23, 229, 8

[56] References Cited

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Primary Examiner—Gene Mancene

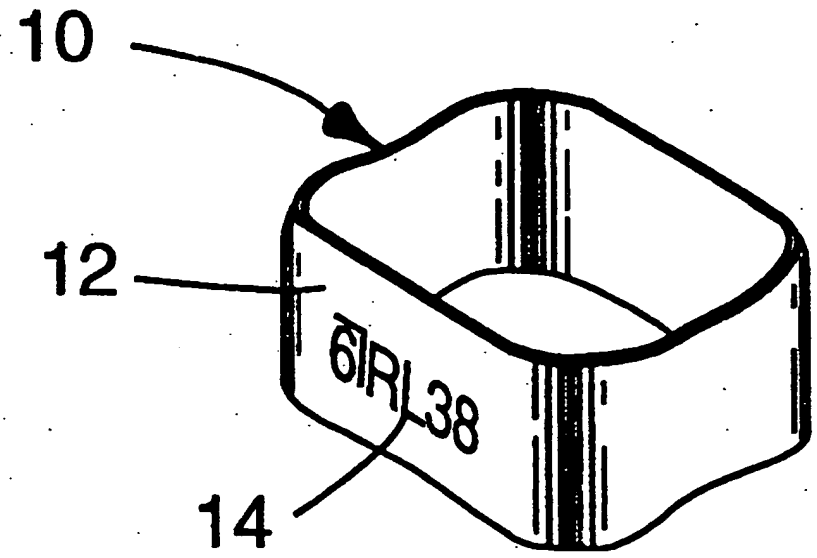
Assistant Examiner—Nicholas D. Lucchesi

Attorney, Agent, or Firm—Gary L. Griswold; Walter N. Kirn; James D. Christoff

[57] ABSTRACT

An orthodontic band has a laser engraved mark with a white, frosty appearance. The mark is characterized by an absence of dark surface oxides, and is aesthetic and easy to read.

5 Claims, 1 Drawing Sheet



US005338915A

United States Patent [19]

Hildebrand et al.

[11] Patent Number: 5,338,915

[45] Date of Patent: Aug. 16, 1994

[54] **PROCESS FOR TEXTURING THE SURFACES OF WORKPIECES WITH A LASER BEAM**

[75] Inventors: **Peter Hildebrand**, Pfronten; **Gunter Eberl**, Waltenhofen; **Josef Neumaier**, Pfronten-Steinach; **Peter Wrba**, Unterthingau, all of Fed. Rep. of Germany

[73] Assignee: **MAHO Aktiengesellschaft**, Pfronten, Fed. Rep. of Germany

[21] Appl. No.: **958,252**

[22] Filed: **Oct. 8, 1992**

[30] **Foreign Application Priority Data**

Oct. 10, 1991 [DE] Fed. Rep. of Germany 4133620

[51] **Int. Cl.**[5] **B23K 26/00**

[52] **U.S. Cl.** **219/121.69**; 219/121.61

[58] **Field of Search** 219/121.69, 121.68, 219/121.61

[56] **References Cited**

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FOREIGN PATENT DOCUMENTS

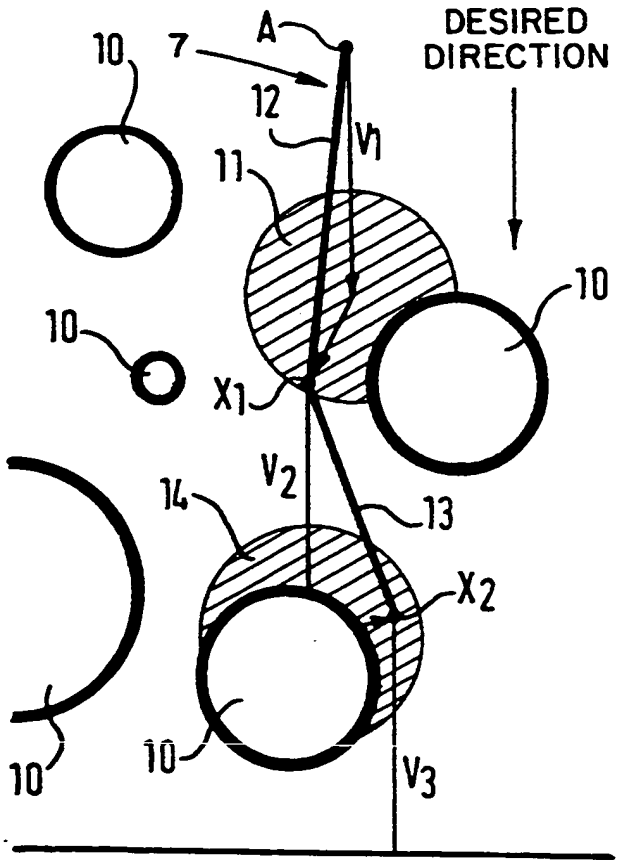
4102984 4/1992 Fed. Rep. of Germany .

Primary Examiner—C. L. Albritton
Attorney, Agent, or Firm—Weingarten, Schurgin, Gagnebin & Hayes

[57] **ABSTRACT**

A process for texturing the surface of a workpiece with a laser beam, the beam being moved by a control unit along a tracking line predetermined by tracking points on the surface of the workpiece to be processed. Desired points that form the midpoints of surface areas are found on the trajectory established on the surface of the workpiece. A tracking point is determined in each of the surface areas. Furthermore, recessed areas and surface areas can be established arbitrarily on the surface of the workpiece, wherein the tracking points fall within the surface areas and not in the recessed areas. Moreover, an imaginary matrix can be formed upon the surface of the workpiece that includes tracking points determined in accordance with a degree of coverage and a random value.

23 Claims, 8 Drawing Sheets



US005800285A

United States Patent [19]

Thorne et al.

[11] Patent Number: 5,800,285

[45] Date of Patent: Sep. 1, 1998

[54] **METHOD OF FABRICATING GOLF CLUB PARTS CARRYING ARTWORK ETCHED AFTER FABRICATION AND PARTS WITH SUCH ARTWORK**

[75] Inventors: **John K. Thorne**, Prescott, Ariz.; **Chester E. Poplaski**, Newark, N.Y.

[73] Assignee: **Sturm, Ruger & Company, Inc.**, Southport, Conn.

[21] Appl. No.: **820,562**

[22] Filed: **Mar. 19, 1997**

[51] **Int. Cl.**[6] **A63B 53/04**

[52] **U.S. Cl.** **473/324**; 473/345; 473/409; 283/74

[58] **Field of Search** 473/324, 330, 473/331, 345, 409; 359/2; 283/74, 85, 86; 235/457

[56] **References Cited**

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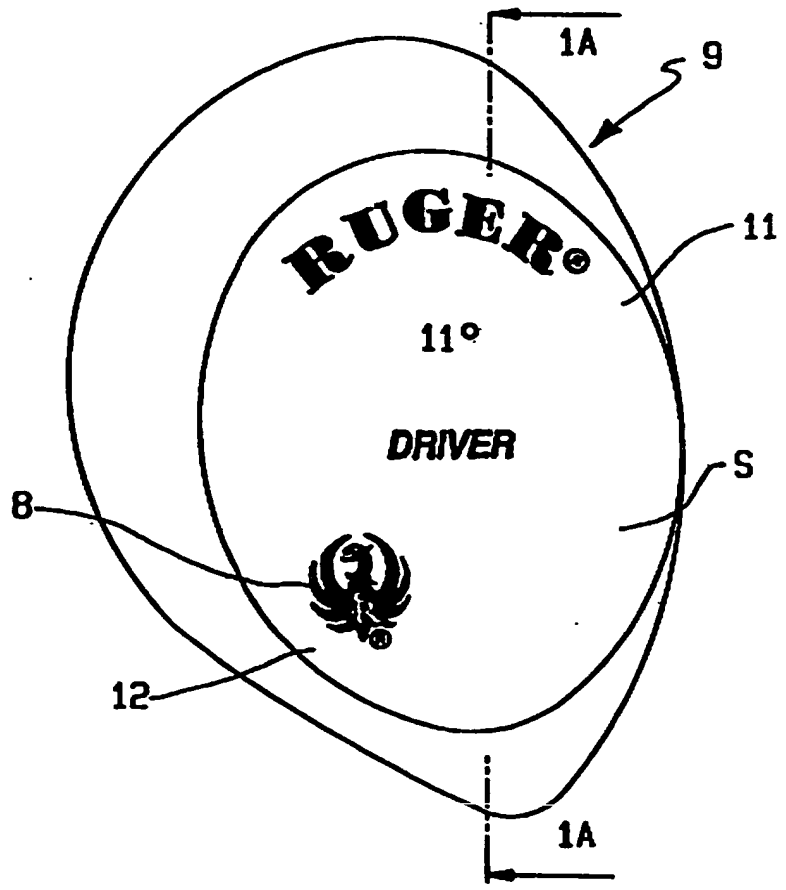
Primary Examiner—Sebastiano Passaniti

Attorney, Agent, or Firm—Pennie & Edmonds LLP

[57] **ABSTRACT**

A golf club part including a metal component requiring subsequent finishing steps after initial formation which part as photo chemically engraved artwork formed in its surface after completion of the finishing step. The method of fabrication and etching of the metal part includes application of photoresist material to the metal surface, use of graphic art film, masking of surface areas in which artwork will be created by subsequent photochemical engraving, thereafter stripping of the photoresist from the metal surface. Creation of customized patterns on graphic art films is accomplished utilizing a programmable computer.

10 Claims, 3 Drawing Sheets



US005990444A

United States Patent [19]

Costin

[11] Patent Number: 5,990,444

[45] Date of Patent: Nov. 23, 1999

[54] **LASER METHOD AND SYSTEM OF SCRIBING GRAPHICS**

[76] Inventor: **Darryl J. Costin**, 25787 Willowbend Rd., Perrysburg, Ohio 43551

[21] Appl. No.: **08/729,493**

[22] Filed: **Oct. 11, 1996**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/550,339, Oct. 30, 1995.

[51] **Int. Cl.**[6] **B23K 26/00**

[52] **U.S. Cl.** **219/121.69**; 219/121.61

[58] **Field of Search** 219/121.72, 121.68, 219/121.69, 121.67, 121.78, 121.8, 121.65, 121.66, 121.6, 121.61; 8/444; 347/253; 430/20

[56] **References Cited**

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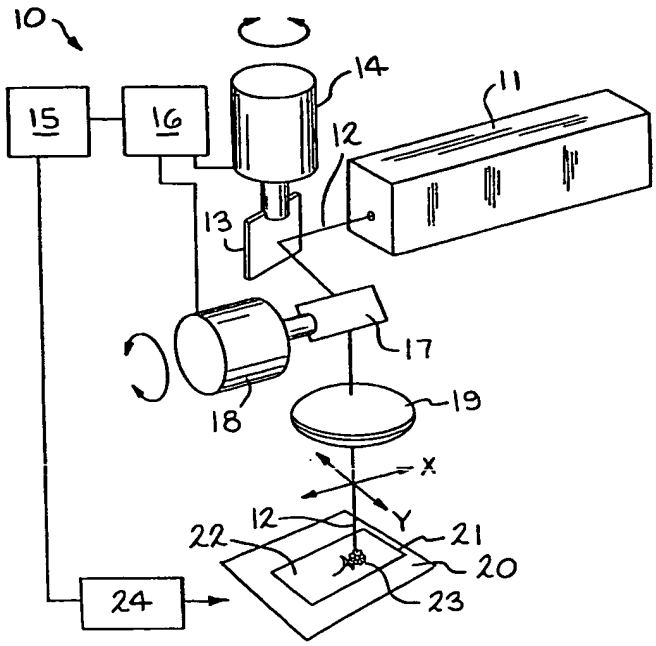
Primary Examiner—Geoffrey S. Evans

Attorney, Agent, or Firm—Scott C. Harris, Esq.

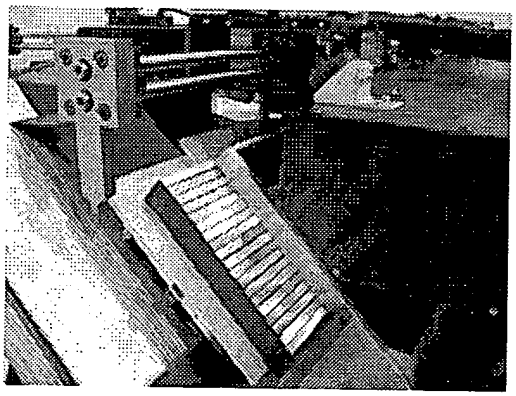
[57] **ABSTRACT**

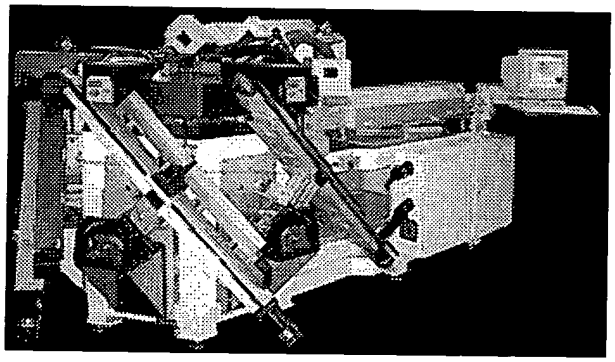
A laser method scribes graphics on materials. The method relates to the identification and understanding of a new energy measurement called energy density per unit time, and the identification and simultaneous control of the laser operating parameters which influence this energy measurement. Once a range of energy density per unit time is determined for scribing a desired graphic on a given material, the energy density per unit time can be controlled to stay within that range to achieve desired results in a repeatable fashion. In a preferred embodiment, the material is one of a group of fabric, leather and vinyl materials. In this embodiment, the energy density per unit time can be controlled to substantially avoid complete carbonization, melting and/or burnthrough of the material.

72 Claims, 25 Drawing Sheets

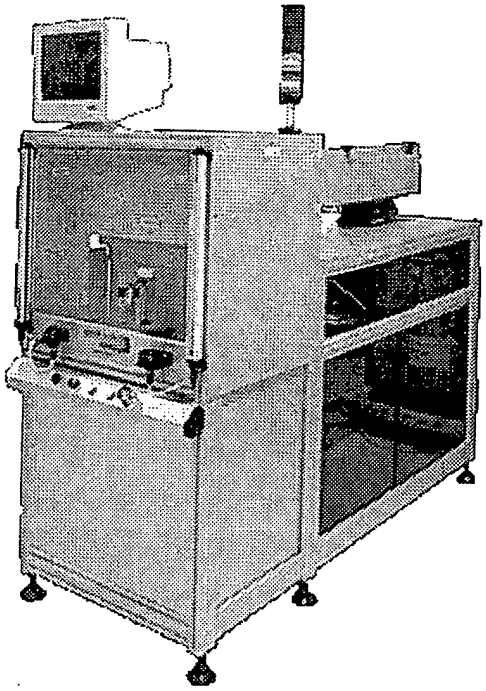


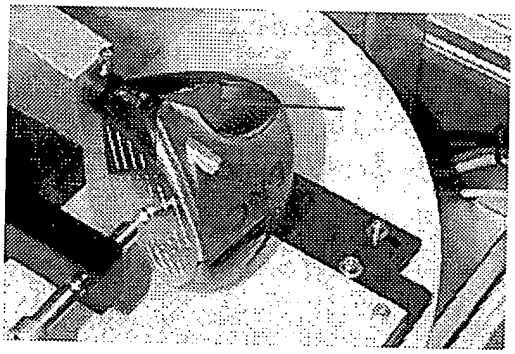
Steel Tool Dies

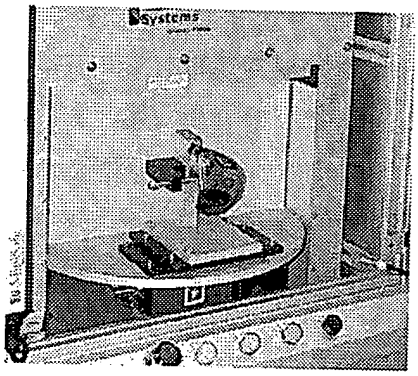




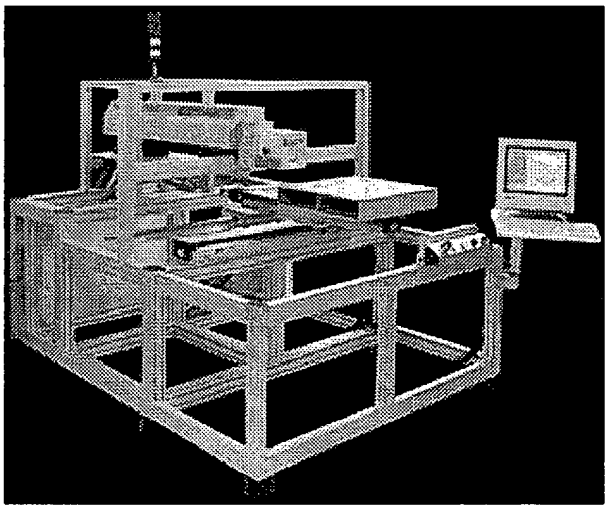
Golf club heads

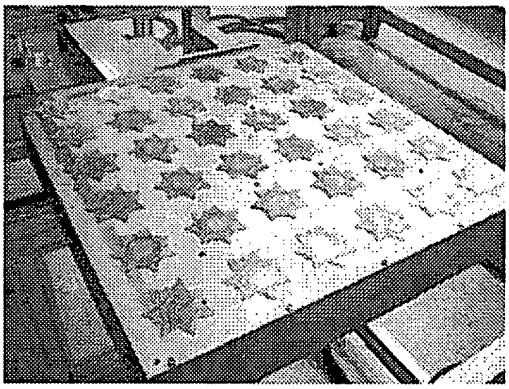






Deep engraving (0.01") in metal





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Overview of Laser Engraving Technology

LASER -- Light Amplification by Stimulated Emission of Radiation -- became a practical industrial process soon after it was invented.

By 1977, automated laser systems were routinely bein holes in turbine blades, cut diamonds, weld heat exch circuits, engrave part numbers on ball bearing races a dimensional information on hardened polished tool bl tremendous advantages in flexibility, speed and perm impact to the part over traditional methods. These adv low costs-per-part more than made up for the initial ca Processing materials by the use of laser methods gre grow rapidly.

Engraving, marking and surface patterning presented the way laser energy was applied to a work piece. Log text are actually very complex patterns compared to ty or cutting programs. Tracing out complex patterns tak usually in short supply in marking applications where the entire output of a factory marking system before goods can be packed and shipped. Methods in which the XY table under a stationary laser head, or where the laser beam is piped to an ov which moves a laser focusing head over the part simply couldn't keep up with the demanded by industry.

Many types of parts are marked attractively with laser

Fortunately, a technology pioneered in 1968 - galvanometer -- was available to solve this pr galvanometers ("galvos") coupled the quickes capable of phenomenal rates of acceleration mirrors. The motor/mirror combination could beam of laser energy faster than the eye cou systems exceed speeds of 10 meters/second motors were upgraded with a computer interf the stage was set for the introduction of a pra engraving with laser light at true factory produ million parts output/year.

Although laser is frequently used to mark only a few alphanumeric characters tha number, it has the flexibility to inscribe virtually any imaginable image, from "line-a thousandths of an inch on a side up to grayscale photographs several feet across

Applications

The range of environmentally-friendly laser engraving/marking/patterning applica nearly as broad as manufacturing itself.

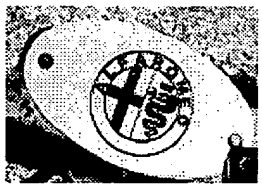
- **The automotive industry** uses laser to mark vehicle identification (VIN) n and to decorate switches and instrument panels -*laser is fast, economical, interior fittings crisply and attractively*.
- **Medical products** marked with laser include implantables such as pace m and heart valves *laser marks permanently without potential contamination*
    - diagnostic instruments
        - *laser is a precise way to lay down rulings, graduations and s*

are autoclavable as well as indelible

- surgical instruments *laser is both economical and permanent and m without raising burrs which can snag delicate surgical gloves*

- **Electronics products**, particularly epoxy encapsulants, hybrid circuits, sili injection molded switches/connectors/packages, have a long history of las *Throughput -- massive throughput -- indelibility of the mark and superior fi these applications, silicon wafers can be marked after photolithography wi debris to contaminate the delicate surface*
- **MIL spec components** are favorite applications for laser marking/engravin *passes all military permanency specifications*
- **Tooling and hardened materials** mark better with laser even than with ch mark more uniformly, efficiently and productively.
- The **advertising specialties** industry has seen a major upsurge of decora the 1990s- *laser offers exceptional flexibility in engraved content: low volu even one-offs can be marked economically*
- **Any product requiring permanent sequential numbering**, from cow ear numbers are marked with laser - *laser systems automatically serialize, num boldly and attractively, laser systems can periodically increment batch num serialize barcodes*
- **Agricultural products** ranging from frozen fish to lumber can be econom laser - *agricultural products are always keenly cost competitive and laser lowest cost-per-mark numbers of all marking methods*

Laser Markable Materials

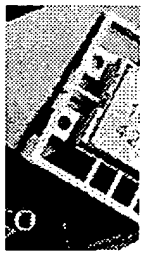


Stainless Steel marked with YAG laser

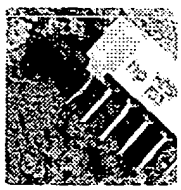
Most any type of metal can be engraved, be treating and coating processes. Most types o ceramics can also be marked. Glass, fiberg composites, wood, paper, rubber and most including chemically inert materials can be r laser. Laser can mark in a line or radially, on surfaces or around tubular stock. Character (20" high in wood paper and plastics).

A Few Laser-Markable Materials

- steels -- mild, alloy, hardened, stainless
- aluminum -- bare, anodized, T6061
- brasses and bronzes
- woods -- hardwoods, softwoods, MDF
- Teflon, nylon, TPFE, acrylic, laminates
- epoxies, solder mask, photoresist
- naugahyde, fabrics, rubber
- glass, ceramic, Corian, slate, marble
- optical films, mylar, adhesive coatings
- carbides, nitrides, silicon, tungsten
- powder coatings, paint



Gold plated marked with



Wood marked with CO2 laser *Plastic marked with*

Typical Laser Marking Applications

- precision mechanical components
- optical components, thru-cutting films
- medical tools, heart valves
- decorative plaques, trim, luggage
- number plates, ID plates
- machinery name plates
- electronics faceplates, bezels
- hardened dies, knife blades, shear blades
- integrated circuits, connectors, switches
- marking inside deep recesses & channels
- pens, plaques, advertising specialtie

Laser can:

- engrave directly into a material,
- engrave through a top coating allowing the material underneath to show th
- chemically alter the surface of a part to create a contrasting mark entirely without edges or depth, or
- Cut all the way through films, foils, paper and wood in a high speed, flexibl

In the aerospace industry, laser engraving provides part traceability on almost any including turbine blades, and on a variety of hydraulic parts. Since the laser can a characters as small as 0.015", it can be used where there would be no room for o methods. Indelible laser marking for security is emerging as the method of choice pharmaceuticals, CD-ROMs, perfumes and other handgoods subject to copyrigh piracy.

Since laser engraving is a non-contact process, it can be used to mark parts that impact and vibratory marking methods. Laser can reach down to the bottom of bl grooves, into the inside bottom of bottles, and other places that only a non-contac By using the laser to anneal material, a mark with characteristics similar to an aci with much higher clarity and contrast. Laser marking can be used on ball bearing other cases where a lack of part distortion is critical. In these cases, the mark can 0.0001" deep. By contrast, in cases where a part might see abrasion, the mark ca 0.010" deep.

Laser engraving equipment can also be used to create barcodes. This can be do or directly on the part. When engraving directly onto the part it is important that th contrast for readability. Barcodes can be put on metals, wood, ink-printed paper a plastics and can be accompanied by the equivalent human readable information. up to automatically change information from mark to mark to serialize a number, from a list of variable names or data or to write from data presented with each cyc from a barcode reading device or other sensor.

Laser Marks are INDELIBLE

- "Adhere" to most surfaces -- including inert flouropolymers such as Teflon
- Cannot be removed without grinding, sanding or otherwise destroying the s

- Stands up to scuffing, abrading, impacts, wear and corrosion
- Chemical-proof, waterproof, oil-, grease-, and fuel-proof
- Retains its appearance and contrast as long as the base material remains
- Tamper proof labels -- separately applied or directly marked onto the prod
- Contrast can be high enough for automatic barcode reading -- this depend

Types of Laser

Laser is light, a special type of light of a single wavelength in which all the light wa order (coherence), like soldiers in step marching across a bridge. As light, it come colors of the rainbow, and many more which cannot be seen with the naked eye. purposes two types of lasers predominate: near infrared **YAG** (Yttrium Aluminum wavelength of 1.06 microns, and far-infrared **CO_2** (named for the gas which is the a wavelength of 10.6 microns. See YAG Laser Markers and CO_2 Laser Markers.

Materials react differently to the different wavelengths of light. For instance, ordin transparent to YAG laser light. Glass is even used for lenses to focus the beam o However, glass is nearly opaque to the longer CO_2 wavelength. Because its ener instead of transmitted, CO_2 engraves glass. On the other hand, most metals read infrared light and are easily marked by YAG laser. Low power CO_2 laser beams u to reflect off metals and do not mark metals well.

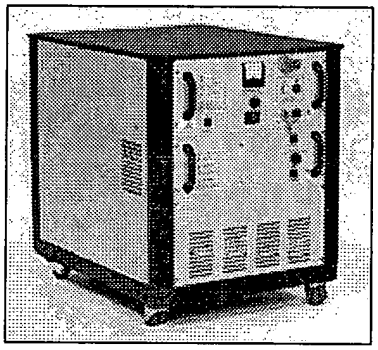
◆**The general rule is:** that metals are best marked with YAG, and wood, paper a marked with CO_2. Plastics tend to mark better with YAG, but cut better with CO_2. composites and filled materials need to be evaluated on a case by case basis. Of general rules, there are many exceptions.

This is why Alase Technologies designs and manufactures both YAG and CO_2 sy virtually every marking need, and provides job shop and consultation services.

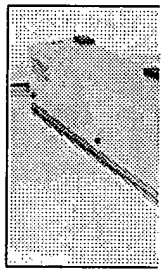
Alase Technologies 7- 5 Lomar Industrial Park, Pepperell, MA USA
tel: 978-433-3000 fax: 978-433-3242 www.alase.com info@alase.c

VersaScribe™ YAG Laser Engraving System Series Overview

The VersaScribe™ YAG series of laser identification, engraving and micromach incorporates the most advanced lasers, servocontrol optics and software availat unique Varifield™ optical design, systems can be configured for a wide range of VersaScribe's wide selection of laser powers provides the flexibility required for l engraving as well as the speed and delicacy of high-volume semiconductor ider VersaScribe™ YAG offers Winlase, an intuitive, easy to use mouse-driven softw Users define artistic elements, control an unlimited number of separate lasering create automated jobs from a fully graphical user interface. TrueType™ text is f run-time fill (positive or inverted). A CAD-file interpreter is provided for importing drawn graphics such as logos or unique designer text. Barcodes, datecoding and automatic. Barcodes and numerals can be serialized.



Designed for high speed, high throughput applications, the VersaScribe™ YAGseries typically marks a part 10 - 100 times faster than traditional flatbed marking systems. VersaScribe's flexible range of fixed and variable field sizes, focused spot sizes and laser powers, coupled with its intuitve easy-to-use software make it the ideal system for any laser engraving, product identification or micromachining application.



Click here for informatio particular mo

VersaScribe™ YAG LASER Engraving System Features and Benefits

- High precision galvanometer scanners for precise control of laser writing the highest system throughput
- Varifield™ systems with adjustable field size, up to 30" x 30", from ultra-fi wide-area focused spots
- AutoDate™ automatic date coding, automatic Barcoding, including the ne ECC-200 codes
- Mark-on-the-fly: compensated marking of moving objects and moving we motion in Real Time
- Step-and-repeat marking of arrays, including serialized arrays, by setting element and repeating it across the field
- TrueType™ fonts, open and filled; HPGL interpreter support for all line-ar
- Winlase Edition: WindowsNT™-compatible software with true multitaskin

multithreading— TCP/IP socket for remote control

- Real-time servocontrol by a dedicated "off-the-bus" card for the highest te performance and the crispest graphics resolution
- Individually programmable I/O— 16 separate inputs and 16 separate outp TURNKEY AUTOMATION INTEGRATION AVAILABLE!
- Built-in automation sequencing language— make the laser system the ei controller with a few clicks of the mouse
- Comes complete with dedicated Pentium™ computer running WindowsN 2000 Professional
- Intuitive, easy to learn/easy to use Graphical User Interface— password p operator access-controlled
- Choice of reliable, conventional flashlamp-pumped YAG lasers from 50 · state diode-pumped YAG lasers, or fiber lasers.

PRODUCT SPECIFICATIONS OF SELECTED MODELS
VersaScribe™ YAG SYSTEMS [wavelength: 1.06 µm]

Model #	Rated Power (Average)	Field Size[1] (mm)	Spot Size (µ)5	Working[2, 3] Distance	Max. Writing[3] Speed	Resol (µn
Y50/4	50 watts 60kW pulsed	110 x 110	100	207	180 characters per second	<7
Y50/8	50 watts 60kW pulsed	180 x 180	130	338	200 characters per second	<1
Y18/4	80 watts (low divergence) 125 kW pulsed	110 x 110	50	207	180 characters per second	<7
Y18/8	80 watts (low divergence) 125 kW pulsed	205 x 205	90	338	200 characters per second	<1
Y100/4	100watts 130 kW pulsed	110 x 110	130	207	180 characters per second	<7
Y100/8	100watts 130 kW pulsed	205 x 205	175	338	200 characters per second	<1
Y150/4	150watts 200 kW pulsed	110 x 110	130	207	180 characters per second	<7
Y150/8	150watts 200 kW	205 x 205	175	338	200 characters	<1

	pulsed				per second	
Y18/4	80 watts (low divergence) 125 kW pulsed	variable 80 x 80 up to 600 x 600	varies based on field size: <50 - <300	varies based on field size: 89 to 650	varies with field size: up to 7.5 m/sec	varies field s <6 to
Y100V	100watts 130 kW pulsed	variable 80 x 80 up to 600 x 600	varies based on field size: <50 - <300	varies based on field size: 89 to 650	varies with field size: up to 7.5 m/sec	varies field s <6 to
Y150V	150watts 200 kW pulsed	variable 80 x 80 up to 600 x 600	varies based on field size: <50 - <300	varies based on field size: 89 to 650	varies with field size: up to 7.5 m/sec	varies field s <6 to

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